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[NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

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(72) Inventor; and

(75) Inventor/Applicant (for US only): **GLEICH, Bernhard**
[DE/DE]; c/o Philips Intellectual Property & Standards
GmbH, Weisshausstr. 2, 52066 Aachen (DE).

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(74) Agent: **MEYER, Michael**; Philips Intellectual Property &
Standards GmbH, Weisshausstr. 2, 52066 Aachen (DE).

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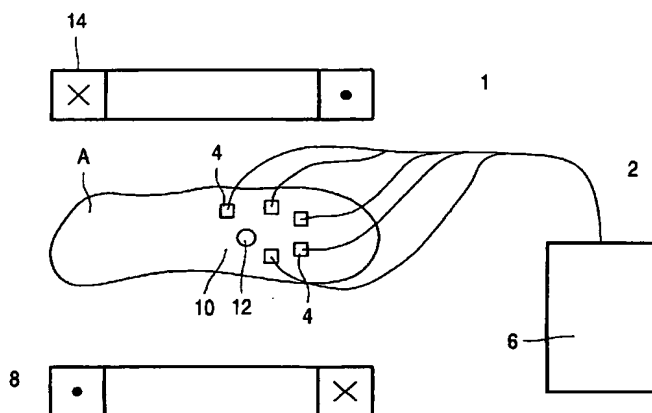
(71) Applicant (for DE only): **PHILIPS INTELLECTUAL
PROPERTY & STANDARDS GMBH** [DE/DE]; Stein-
damm 94, 20099 Hamburg (DE).

(71) Applicant (for all designated States except DE, US):
KONINKLIJKE PHILIPS ELECTRONICS N.V.

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(54) Title: **DEVICE AND METHOD FOR EXAMINATION AND USE OF AN ELECTRICAL FIELD IN AN OBJECT UNDER EXAMINATION CONTAINING MAGNETIC PARTICLES**



(57) Abstract: The present invention relates to a device for examination and use of an electrical field in a magnetic gradient field, containing magnetic particles in an examination area of an object under examination, comprising a) at least one first arrangement for determining the spatial distribution of magnetic particles in at least one examination area of the object under examination, comprising a means for generating a magnetic field with such a spatial magnetic field strength profile that a first sub-zone with low magnetic field strength and a second sub-zone with higher magnetic field strength are produced in at least one examination area, a means for detecting signals which depend on the magnetization in the object under examination, especially in the examination area, influenced by a local change in the particles, together with a means for evaluating the signals

to obtain information about the, especially time-variable, spatial distribution of the magnetic particles in the examination area; and b) at least one second arrangement, comprising at least one electrical transmit and/or receive unit, comprising at least one voltage generator, at least one terminal contact connected to the voltage generator and applicable and/or fastenable to an object under examination, and a ground terminal applicable and/or fastenable to an object under examination. The invention also relates to a method of determining the, especially threedimensional, conductivity distribution in an examination area of an object under examination using a device according to the invention, a method for drug or active ingredient release, especially in locally targeted manner, in an examination area of an object under examination likewise using a device according to the invention, as well as use of a device according to the invention for electro-stimulation. The invention further relates to an electro-physiologic contrast composition, to a method for the manufacture of said contrast composition and to a method for imaging electric resistivity or conductivity in an examination area in particular to a method for imaging internal electric fields using the electro-physiologic contrast composition according to the invention.

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GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61B A61N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	LEVY S ET AL: "ELECTROMAGNETIC IMPEDANCE TOMOGRAPHY (EMIT): A NEW METHOD FOR IMPEDANCE IMAGING" IEEE TRANSACTIONS ON MEDICAL IMAGING, IEEE INC. NEW YORK, US, vol. 21, no. 6, June 2002 (2002-06), pages 676-687, XP001124756 ISSN: 0278-0062 abstract; figures 1,2 pages 676-679, paragraphs 1,11	1-14
A	US 5 639 444 A (KLAVERNESS JO) 17 June 1997 (1997-06-17) the whole document ----- -/-	1-7

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
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- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Lahorte, P

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/138019 A1 (MU ZHEN ET AL) 26 September 2002 (2002-09-26) abstract; figure 1 paragraphs [0001] - [0023] paragraphs [0035] - [0047] -----	1-7
P,A	DE 101 51 778 A (PHILIPS CORP INTELLECTUAL PTY) 8 May 2003 (2003-05-08) cited in the application the whole document -----	1,8-14
A	US 6 168 780 B1 (ANDRAE WILFRIED) 2 January 2001 (2001-01-02) abstract; figure 1 column 2, line 49 - column 3, line 35 column 3, line 52 - column 4, line 65 -----	1,8-14
A	US 5 794 622 A (CHOPP MICHEAL ET AL) 18 August 1998 (1998-08-18) abstract; figure 1 column 1, line 45 - column 2, line 31 column 2, line 59 - column 3, line 61 -----	1,8-14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2004/050448

Box II Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: 15-32, 44, 47-48, 50
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-14

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos.: 15-32, 44, 47-48, 50

Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

A device for electrical impedance measurements of an examination area in an object.

A contribution to the prior art seems to reside in the combination of the features of a first arrangement for determining the spatial distribution of magnetic particles with the features of a second arrangement for impedance measurements, allowing high-resolution conductivity measurements.

2. claims: 33-43, 45-46, 49, 51

Electro-physiologic contrast composition and process for manufacturing such a composition.

A contribution to the art might reside in the features of the magnetic and electric anisotropic direction of the contrast particles comprised by the composition.

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